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Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554

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MAY 04 1993

In the Matter of )

FCC MAIL ROOM

Replacement of Part 90 by Part 88 to )  
Revise the Private Land Mobile Radio )  
Services and Modify the Policies )  
Governing Them )

PR Docket 92-235

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MAY - 4 1993

FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF THE SECRETARY

REPLY COMMENTS OF  
THE NEW HAMPSHIRE FLYING TIGERS

## Discussion:

The following information was originally prepared by the FCC and distributed to Senators and Congress persons to answer their concerns about NPRM 92-235. As this "Information sheet" seems to have omitted the view of the RC community, we are submitting this same 'information' with additional facts to properly represent the actual use of radio control models in the real world. Sections are identified as being either from the FCC or from the RC community.

### Information sheet from the FCC:

*Subject: Radio Control in the 72-76 MHz band*

#### 1.0 FCC Question:

*What is the 72-76 MHz band used for?*

#### 1.1 FCC Answer:

*The frequency range between 72-76 MHz is primarily a guard band between TV channels 4 and 5. Specifically, the channels between 72 and 76 MHz are licensed for use by 1) private and common carrier fixed station use at up to 300 watts output power (private and common carrier fixed use occurs on the same channels) and 2) private land mobile use at up to 1 watt output power. The channels between 72 and 76 MHz are also available for unlicensed secondary use by remote control operators of model aircraft, boats and cars at .75 watts output power.*

#### 1.2 RC Answer:

True. We have been able to share this band successfully. In fact, the sharing has been so successful that there are now thousands of active radio control enthusiasts in any particular area of the country. I believe that there are so many now, that to consider us secondary users would be similar to trying to call CB operators 'secondary users' of the 27 MHz band. We may legally be 'secondary', but the FCC has allowed this use for such a long time, that by our sheer numbers alone, we must be considered the primary users, and the private and common carrier users should be considered secondary.

## 2.0 FCC Question:

*What is the relationship between fixed and mobile land mobile operations and radio control operations?*

### 2.1 FCC Answer:

*Radio control channels are located between fixed and mobile channels. The radio control channels overlap with the fixed and mobile channels. Radio control operations are unlicensed and are secondary to fixed and mobile operations. This means that radio control operations must accept interference from fixed and mobile users, and may not cause interference to such users.*

### 2.2 RC Answer:

The radio control use of these channels has been without too many problems in the past. This is because most of the users in this band are fixed stations. If a fixed station is causing interference to an RC channel (or pair of channels) then the offending channel(s) can be not used in that particular area. This scheme works only because the RC operators were sharing the band with fixed stations, that are easy to locate and identify. Yes, because of current FCC rules, we are legally considered the 'secondary' users. Because of the nature of the fixed stations with which we share the band, we are able to peacefully coexist.

We have developed new technologies to allow our equipment to reject signals that are 10 kHz away from our channels, as the fixed stations currently are. The NPRM proposes channel spacing of 2.5 kHz with a frequency tolerance of 50 parts per million (PPM). This places these signals right in the middle of the pass band of an RC receiver, which requires other signals to be at least 10 kHz away so as not to cause interference. This does not leave any room for a reasonable frequency tolerance. A frequency tolerance of 50 parts per million (50 PPM) would allow for a drift in frequency of 3.6 kHz. This would place the proposed signals right on top of our RC channels and still be considered in tolerance!

## 3.0 FCC Question:

*What changes are proposed in PR Docket 92-235 that have raised the concern of radio control operators?*

### 3.1 FCC Answer:

*We have proposed that over a 20 year period, 20 kHz mobile channels in the 72-76 MHz band be replaced with 5 kHz mobile channels. Apparently, radio control operators believe that this would make many of their frequencies unusable.*

### 3.2 RC Answer:

**Yes**, this would make most of our frequencies unusable. Our state of the art receivers can reject signals that are 10 kHz away. The proposal has new channels 2.5 kHz from our center frequencies. If a tolerance of 50 parts per million (50 PPM) was allowed (as specified in the NPRM), then these new signals could deviate as much as 3.6 kHz. This places these new signals right on top of our channels. We must also remember to take into account that these signals are modulated with information. This information modulation causes a signal to occupy space and be wider than the carrier alone. This means that a signal just 2.5 kHz away from our RC channels if modulated with a deviation of 1 kHz would occupy at least 2 kHz of spectrum (the carrier frequency and 1 kHz above and below the carrier frequency). Current technology narrow band FM signals use a deviation of 5 kHz which consumes at least 10 kHz of band width. The proposal is promoting the use of new 5 kHz channels. This would consume plus and minus 2.5 kHz, occupying a full 5 kHz of band width. This will leave no space between the proposed 5 kHz channels for the RC channels to occupy. This also leaves no space to allow for any reasonable frequency tolerance (even an impractical frequency tolerance of 0 PPM)! Summary: Current RC equipment can **NOT** tolerate a signal closer than 10 kHz.

### 4.0 FCC Question:

*Private land mobile, common carrier, and radio control users have peacefully shared spectrum in this band for many years. Would these changes lead to problems between various classes of users?*

### 4.1 FCC Answer:

*We can not categorically state that authorized mobile operations under the current or proposed rules could never harm radio control operations. However, in practice, all types of users can and do operate without conflict, although there are rare occurrences of interference between these users. We believe that under our proposed rules they should remain rare.*

*First, permitted power levels for both services are comparable. (For radio purposes, 3/4 of a watt is indistinguishable from 1 watt.) In approximate terms, this means that even if a factory and a radio control hobbyist shared a channel, which they would not under this proposal, the radio control user's model airplane would continue to stay under control as long as the plane is reasonably closer to the hobbyist's radio transmitter than the factory's radio transmitter. The fact that two users would not be using the exact same frequency significantly reduces risk of interference.*

#### 4.2 RC Answer:

Yes, the power levels are very similar, but 3/4 of a watt is the legal maximum power that an RC transmitter can use. As all RC transmitters are battery powered, most of these transmitters actually output less than the legal maximum output power to conserve battery life (a typical RC transmitter output is between 1/4 and 1/2 of a watt). Also keep in mind that model aircraft do not usually stay very close to the transmitter. As many flying sites are near industrial parks (and therefore factories), many RC aircraft can fly very near, or directly over a factory. Since the receiver is now closer to the factory transmitter than the controlling RC transmitter, the aircraft will go out of control due to the interference from the factory transmitter! Also, due to allowed frequency tolerances, the factory transmitters could legally be right on top of the same channel that the RC aircraft is using. On top of this is the fact that only the better RC receivers can reject a signal that is as close as 10 kHz. Signals as close as the proposed 2.5 kHz can **NOT BE TOLERATED and WILL cause INTERFERENCE!** Even if the proposed frequency tolerance was much tighter, the modulation of the signal in the proposed new service would cause it to consume all of our channel space and thereby interfere with our signals!

#### 4.3 FCC (answer continued):

*Second, the proposed narrow band technical requirements are much stricter than current requirements. Thus, a 2.5 kHz frequency separation between land mobile and radio control users should be adequate given modern radio control equipment and the proposed land mobile equipment.*

#### 4.4 RC Answer:

NO! Our current state of the art equipment developed under the 1991 stricter standards can only tolerate a signal as close as 10 kHz. If that transmitter was physically close to the RC operations, then 10 kHz may not even be enough spacing. This is from experience with current state of the art RC equipment. One must remember to also take into account the frequency tolerance of both systems, and the space that each modulated signal will consume, not just the center frequency and tolerance of an unmodulated carrier signal of the proposed new service.

#### 4.5 FCC (answer continued):

*Third, land mobile operations authorized on the 72-76 MHz band are not car phones. Rather, these channels are used in limited locations such as a factory or construction site, mainly for non-voice operations to monitor or control expensive equipment such as overhead cranes. Model airplane enthusiasts seek clear areas and fields. Thus, the two classes of users rarely notice each other. The proposed technical standards would not change this important fact.*

#### 4.6 RC Answer:

**NO!** This may be true out in the farm-lands of the Midwest. Here in congested New England, or any other industrialized area of the country, there are not many 'clear areas and fields' available to RC modeling. In fact, of the several flying sites that we know of, only one of these is not located at an industrial park! Several of the flying clubs in the area must use the areas near industrial parks because this is the only areas available that are safe to fly. Other areas are too congested with homes and schools, etc. It would not be safe for us to fly in such congested areas. Therefore, we fly very close to factories and industrial parks.

This information creates an even worse situation! If these new 2.5 kHz channels are going to be for the operation of overhead cranes and other expensive equipment, how is the FCC going to provide a safe environment for the operation of such equipment. What is going to prevent an RC enthusiast from taking his equipment to fly an aircraft, or operate a model car very near to such a dangerous piece of equipment as an overhead crane. When a person is killed from this type of accident, how will the FCC answer: How could you let this happen?

You should also realize that RC model aircraft travel in a three dimensional space. The receiver for these systems is located in the aircraft. This places the antenna for the receiver high in the air, and subjects them to an extremely varying signal strength from the RC transmitter, and from the proposed new service. Because a model aircraft is such a dynamic object you must take the RC receiver specifications into account, and not assume that the aircraft will be closer to the RC transmitter than the interfering transmitter when trying to propose frequency sharing of this type.

This new service should be located in a different part of the spectrum. There is plenty of other spectrum that is available, such as the 220 MHz to 222 MHz spectrum that was recently taken from the Amateur Radio service. Also there are large amounts of unused spectrum in the UHF television channel range. The government is allocated huge amounts of spectrum that is under-utilized. I would think that such operations as proposed in the NPRM should not consider any frequency below 150 MHz to be sure that such operations would not be subject to interference from distant signals that can propagate over large distances during sunspot activity every 11 years.

5.0 FCC Question:

*Would the technical rules for the fixed users be changed?*

5.1 FCC Answer:

*No. We are not proposing technical changes because such changes could have a significant adverse impact on other users, including mobile users and radio control operators.*

5.2 RC Answer:

The proposed new channels will have a significant adverse impact on the radio control operators. It will cause operation of our aircraft to be unsafe. Possibly causing someone to be killed when a flying model is interfered with from the proposed new channels, or an overhead crane to go out of control from interference from a nearby RC operator.

6.0 FCC Question:

*Would any changes be required of radio control users?*

6.1 FCC Answer:

*No. Current technical and operational requirements for radio control operations are compatible with the proposed changes for private land mobile radio use.*

## 6.2 RC Answer:

**Not True!** The current technical and operational requirements of radio control equipment are not compatible with the proposed changes! Our equipment can only tolerate signals that are 10 kHz away from our frequencies. This spacing allows for a reasonable frequency tolerance. Also, the current operation is not mobile (and is fixed). This allows interference to be located and handled with on a case by case basis. When such interference is identified, we can stop using the channels that are interfered with (as required by our current secondary status). If the proposed changes are adopted, we could never be sure where such interference is coming from, so we could not take corrective actions. Also the proposed 2.5 kHz channel spacing would definitely interfere with our operations that frequently occur very close to factories, construction sites, and industrial parks.

## 7.0 FCC:

*Finally, we recognize that our proposed rules are based on the information available at the time we wrote them. We seek constructive information in order to adopt final rules that meet our objectives of expanding capacity for private land mobile radio users with minimal or no harm to all existing users of the spectrum.*

## 7.1 RC Answer:

Yes, we recognize that you may not have reviewed the technical standards of equipment that current RC operators are using or can purchase. Please review our actual operating practices and do not base your decisions on theory. Please consider much of the available spectrum for these new users. If that is not an option, and I don't know why it wouldn't be for a new technology, then please provide spectrum for RC operations as primary users. The new frequencies should provide enough spectrum for us to migrate to in time. It should also be above 150 MHz. Since our models must be kept in sight to allow us to maintain control of them, VHF or UHF frequencies would be ideal. Remember that there are hundreds of thousands of citizens using RC equipment in this country. This must be taken under consideration. We must have primary use of spectrum to insure safety. We would be willing to pay license fee's to be considered primary users, if that is necessary.

We do feel that the FCC is trying to allow for more usable spectrum space by asking users to migrate to narrower channels. This, in general, is a good idea. But plans such as this must take into account us so called 'secondary users'. By our sheer numbers, RC operations can not be ignored. If you must adopt this new narrow band width channel scheme, please provided a place for safe RC operations in one of the following two manners:

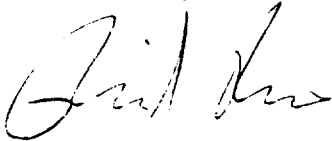


- Provide a new frequency band for RC operations to migrate to. Include at least the same number of channels that we currently have allocated (50 channels for aircraft use, and 30 channels for land operations). The new band can safely be of the 5 kHz narrow band specifications, because all equipment manufactured for this band can be designed for this new narrow band width. Also, because there will be no overlapping channels, there will be no problem with interference. This new band should be above 150 MHz to minimize potential interference from ionospheric propagation. Allow 8 years for current RC equipment to be used on the current band. Open the new band for use by RC systems within 2 years. Do not allow the proposed 5 kHz use of 72-75 MHz for 10 years. This will allow all RC operations to migrate to the new band in an orderly fashion with minimum impact on RC users or manufacturers.
- If there is no new band of sufficient spectrum space to provide for an equivalent number of RC channels (80, 5 kHz channels), then do not allow the RC channels to be overlapped by the new 5 kHz channels. Provide for the proposed new channels to be at least 5 kHz from our current channels. This would provide us with non-overlapping interference free 5 kHz channels. Allow the proposed land mobile 5 kHz channels to be used after 10 years. Provide regulations to force a migration of RC equipment to the new 5 kHz channel spacing in at least 8 years. This will insure that by the time that the new land mobile 5 kHz channels are implemented, that the RC industry has had enough time to implement the new technology that is required to operate properly in this new environment.

Either of these schemes will allow the RC operations to continue without problems or undue hardship. The RC industry has just completed a similar change in equipment. In 1991 all RC operations had to become narrow band to allow operation within the 10 kHz spacing that we now enjoy. By allowing a ten year migration period, an undue burden will not be placed on the RC operators. This solution is only feasible if RC operations are provided for directly. Since the FCC is promoting the new 5 kHz channels to the land mobile service as generating thousands of new land mobile communications channels, then the small amount of spectrum that RC operators use will not be an undue burden on the commercial land mobile operators.

We do understand that frequency spectrum is a natural resource. This is similar to real estate. Once all the spectrum is used, more of it can not be manufactured. There is very little spectrum that is allocated for the direct use of the general public. The small amount of spectrum that the radio control operators are using is probably the only organized public use of any spectrum. As our national parks are preserved for the orderly use and enjoyment of the general public, the spectrum allocated for radio control operations should also be guarded and preserved.

Respectfully submitted,

A handwritten signature in cursive script, appearing to read "Richard Bono".

Richard Bono  
Assistant Safety Officer,  
New Hampshire Flying Tigers RC Club